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Intergovernmental Oceanographic Commission





## UNESCO/IOC Tsunami Ready Recognition Programme

3.3 Preparedness Indicators – Community Evacuation Map, Outreach and Public Awareness, Exercise

Carolina Hincapié-Cárdenas International Tsunami Information Centre (ITIC)



## **Tsunami Ready Indicators**









### **UNESCO IOC TSUNAMI READY INDICATORS**

### ASSESSMENT (ASSESS)

- 1 ASSESS-1. Tsunami hazard zones are mapped and designated
- ASSESS-2. The number of people at risk in the tsunami hazard zone is estimated
- ASSESS-3. Economic, infrastructural, political, and social resources are identified

### II PREPAREDNESS (PREP)

- PREP-1. Easily understood tsunami evacuation maps are approved
- 5 PREP-2. Tsunami information is publicly displayed
- PREP-2. Outreach and public awareness and education resources are available and distributed
- 7 PREP-3. Outreach or educational activities <u>are held at least</u> three times a year
- 8 PREP-4: A community tsunami exercise is conducted at least every two years

### III RESPONSE (RESP)

- RESP-1. A community tsunami emergency response plan (ERP) is approved
- RESP-2. The capacity to manage emergency response operations during a tsunami is in place
- RESP-3. Redundant and reliable means to timely receive 24-hour official tsunami alerts are in place
- RESP-4. Redundant and reliable means to timely disseminate 24-hour official tsunami alerts to the public are in place



## Prep-1 Easily understood tsunami evacuation maps are approved







The evacuation map should:

\* show <u>evacuation zones</u>, <u>routes</u>, <u>safer areas as</u> <u>higher ground or tsunami shelter</u>, <u>assembly areas</u>, critical and sensitive facilities

\* use the <u>tsunami hazard map as a basis</u> for its preparation (deliverable of ASSESS-1)

\* The <u>community should be involved</u> in its preparation to <u>incorporate local knowledge</u>



Evacuation map in Praia da Batata, Lagos, Portugal.



#### Home

### **Contact ITIC**

General Info
World Tsunami Day
Hawaii Information
American Samoa Info
About Tsunamis
Am I in Danger?
What to Do?
Aware, Educate
Photo, Video, Graphic
Quick Info - Media
FAOs

**About ITIC** 

Technical Info
Current Warnings
About Warnings
Tsunami Events
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Meetings
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Marine Ports Guide
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### Intergovernmental

Global System
Pacific (PTWS)
Info Centers
ITIC Training
Tsunami Exercises
UNESCO/IOC Tsunami
Ready Programme

### Tsunami Evacuation Maps, Plans and Procedures (TEMPP)

- TEMPP Pilot
- TEMPP Trainings

Community preparedness is vitally important because it enables a rapid appropriate response to both official warnings and the natural signs of a possible tsunami. This is critical for saving lives for all tsunami events, and it is even more essential for locally generated tsunamis which can arrive in minutes and before an official tsunami warning is issued by authorities.





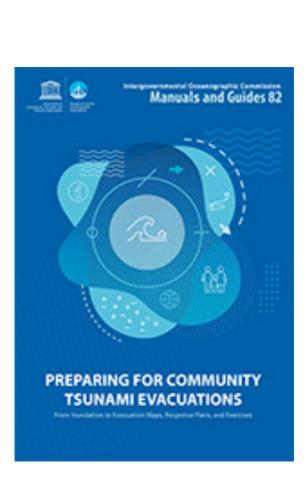
Two important components of preparedness are science-based tsunami inundation maps and community-developed tsunami evacuation maps and plans. Communities are best prepared when they are aware of their tsunami hazard, and together decide how they will be most ready for the next tsunami.



To describe the steps required to produce reliable and practical community-level tsunami evacuation maps, the IOC published *Preparing for Community Tsunami Evacuations: from inundation to evacuation maps, response plans and exercises* (UNESCO IOC Manuals and Guides 82, 2019) as a reference and training manual.

The manual was developed as an activity of the IOC Intergovernmental Coordination Group for the Pacific Tsunami





Oceanographic

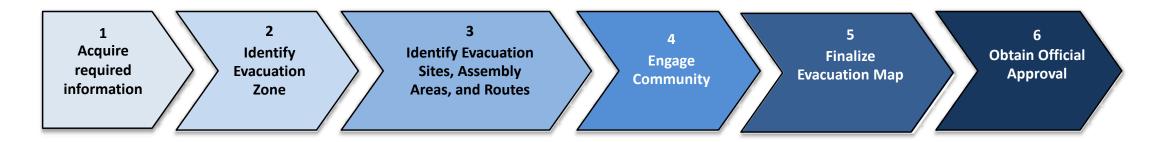






Evacuation maps should be simple and easy to read and should include essential information

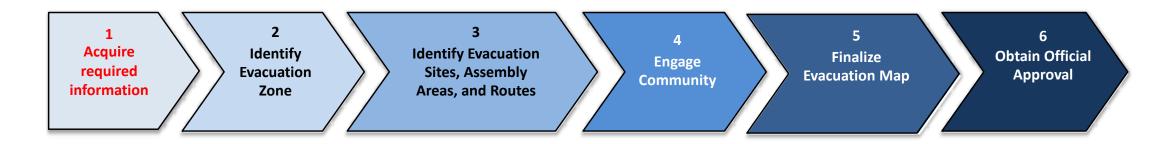
The following 6 steps should be followed to develop evacuation maps:









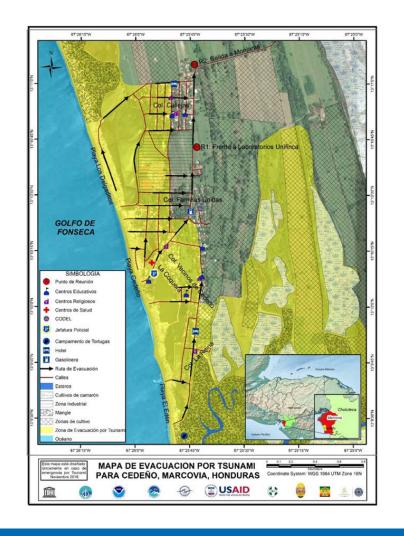


- \* Tsunami inundation map (gives flooding extent from worst case and credible tsunami scenario)
- \* Tsunami wave arrival time (useful to do the evacuation planning)
- \* Geospatial data layers (natural and built environment, population demographics, road systems, infrastructure and critical facilities, houses, etc)
- \* GIS software (QGIS, ArcGIS) and GIS mapping experts

## From inundation map to evacuation map – example from Cedeño, Honduras



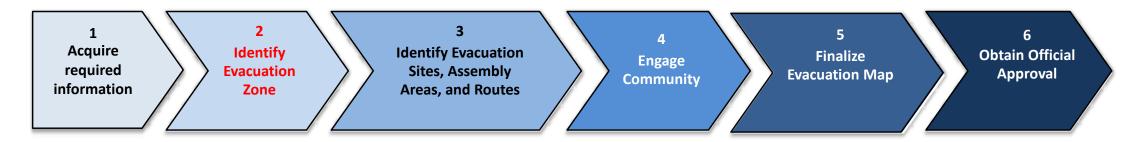












Safety factors to consider when drawing the evacuation zone line are:

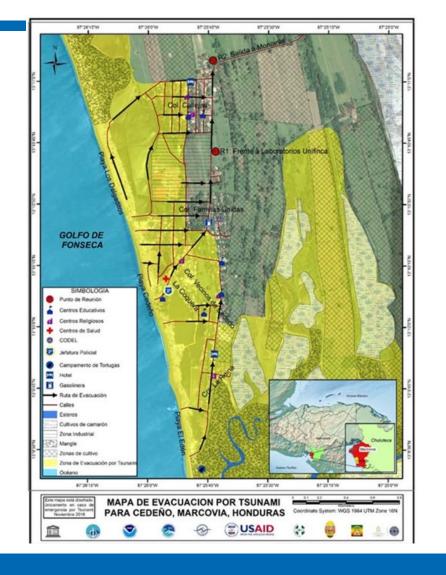
- \* Proximity and location of high ground (hills, cliffs, man-made vertical refuges (berms, tall buildings, etc);
- \* Safety buffer for potential uncertainties in the inundation map;
- \* Knowledge of flood zones, types of roadways and locations;
- \* Availability of identifiable landmark locations for easier evacuation routing;
- \* Hazardous Materials (HAZMAT) sites and other potential hazards (secured gates or high fences, lumber yards or harbours with potential floating debris etc.) that could cause evacuation problems;
- \* <u>Locations of special needs population in evacuation zone</u> (i.e. hospitals, elder care or nursing facilities, schools, day care centres, non-English speakers, transient populations, etc.).

### Sensitive Facilities – Cedeño, Honduras







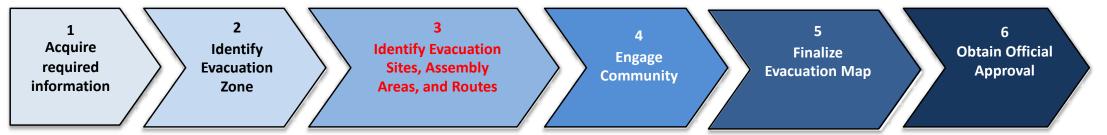












Decide criteria for determining assembly sites and evacuation route. The following are possible bases for selection of the site:

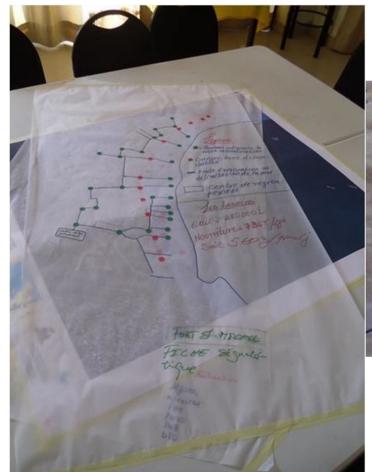
- \* Site is outside of identified Tsunami Evacuation Zone;
- \* Site can be <u>reached by foot</u> within the shortest possible time. Ease of egress by foot is the first priority, including for special needs populations;
- \* The total area of <u>site can hold the expected number of people</u> (or certain percentage of population of the community if several sites are selected);
- \* Site can be <u>easily identified by residents</u>, for example a prominent hill, a school, an open park among others
- \* <u>Evacuation routes should avoid areas that could suffer damages from strong earthquakes</u> such as collapsed bridges, buildings, power lines and landslides, which may block routes and cause hazardous conditions.
- \* Route and site can accommodate special needs populations (portion of the public sector that is willing, yet incapable of leaving the Evacuating Zone).

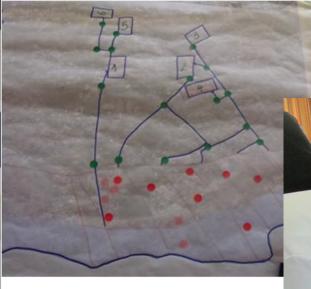
## **Working on Evacuation Maps**









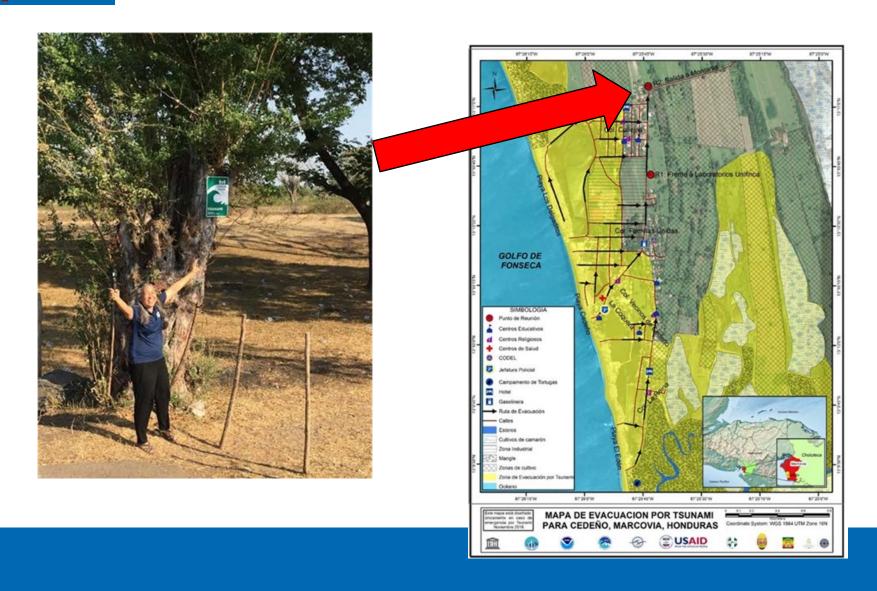


## Meeting Point – Cedeño, Honduras example





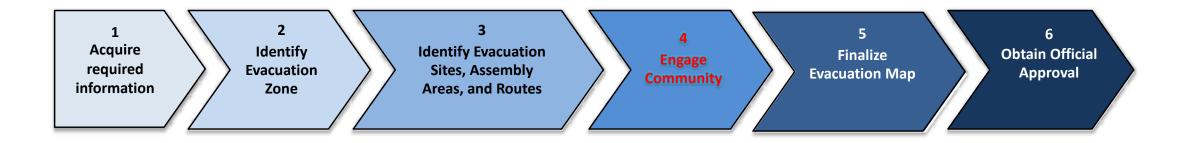












- \* At least one meeting should be held with the community and its leaders to obtain their input.
- \* Invite all <u>stakeholders</u> who have a response, coordination, or special needs requirement (e.g., hospitals, schools).
- \* <u>Engage and explain inundation mapping results and draft evacuation zone</u>, evacuation areas, assembly sites, refuges, or shelters, evacuation routes, and signage.
- \* <u>Field visits to view topographic and built environment conditions may be needed</u>. Evacuation <u>routes should be walked by the community to confirm ease and timing for successful egress.</u>

## Community Engagement – Cedeño, Honduras unesco









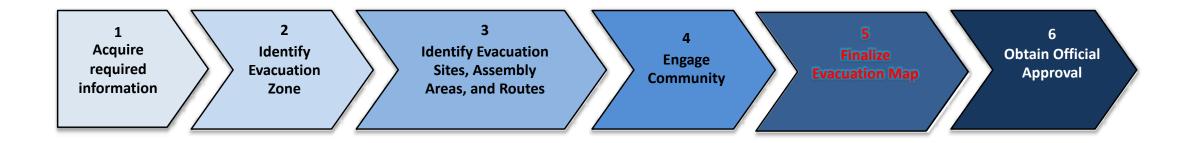












The community input is needed to finalize the drawing of the lines, evacuation/areas and routes, and signage.

- \* Colours (zones, streets, routes, signage, symbols, topography if shown),
- \* Legend,
- \* Inclusion of tsunami warning and safety information (awareness),
- \* Inclusion of evacuation information (instructions, guidelines).

### Indonesia

### Tsunami Evacuation Procedure

- If you feel an earthquake protect yourself
- Don't panic!
- . Drop, cover and hold!
- 2. After an earthquake, be aware that a tsunami may follow
- Move away from the beach immediately as a precaution measure!
- Look for more information through TV and Radio!
- After a strong and prolonged earthquake, evacuate immediately!
- Don't wait for an official warning, leave the RED ZONE immediately if possible or look for shelter in higher buildings
- If you are around Pratama Street, look for shelter in one of the hotels with higher floors
- As a visitor in a hotel, please follow the instructions of hotel staff
- The sound of the siren is the official call for evacuation
- If the siren sounds, follow the evacuation procedure as indicated above (No. 3)!

Be aware that the siren may not be heard in all areas.

After the first tsunami wave, more waves are likely to come!

Wait for an official "All Clear" message before leaving shelter

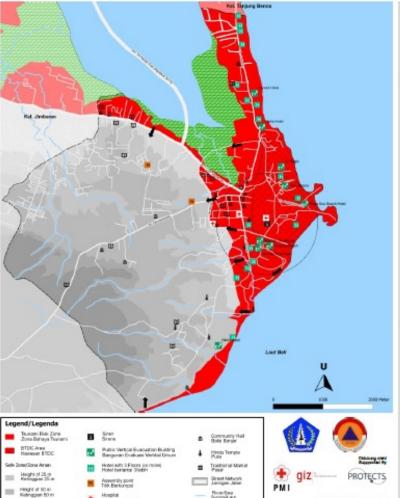
Height of 75 m Kellingson 75 m

Heapt of 100 m Kellingson 100 m

Height of >100 m. Ketinggian >100 m.

\*Please note that BTDC has its own procedure

### Tsunami Evacuation Map for Benoa Peta Evakuasi Tsunami di Kelurahan Benoa



--- Administrative Bords Bates Administrati

Manageove Huter Bakes Purther information / informati lebih lanjut

BPSD Kabupaten Badung Jin Raya Raya Sempidi, Hengwi

Tel. 0381-7911166

### Prosedur Evakuasi Tsunami



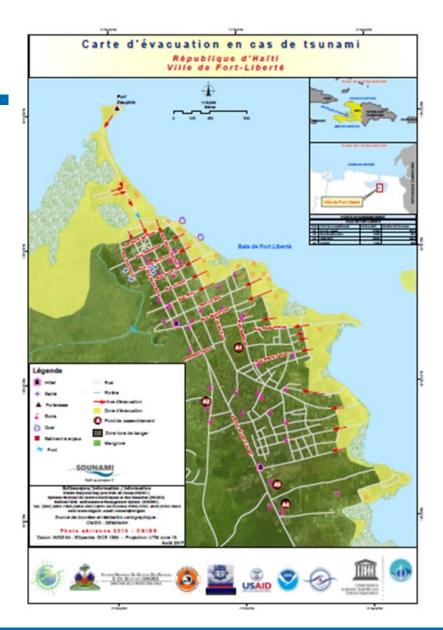
- Jika merasakan gempabumi lindungi diri anda
- Jangan panik
- · Merunduk, berlindung dan berpegangan
- Setelah gempabumi, sadari bahwa tsunami mungkin terjadi
- Segera tinggalkan daerah pantai sebagai langkah pencegahan awal
- Carilah informasi lebih lanjut melalui TV dan Radio
- Setelah gempabumi yang kuat dan lama, Segera Evakuasi!
- Jangan menunggu peringatan resmi, segera tinggalkan ZONA MERAH jika memungkinkan atau mencari tempat berlindung yang lebih tinggi
- Jika anda berada di sekitar Jln. Pratama, segera berlindung di bangunan bertingkat 3/lebih
- Jika anda pengunjung,ikuti arahan dari karyawan hotel
- Bunyi sirene adalah panggilan resmi evakuasi
- Jika sirene berbunyi, ikuti prosedur evakuasi seperti diatas (No. 3)!

Sadari bahwa mungkin bunyi sirene tidak terdengar di semua area.

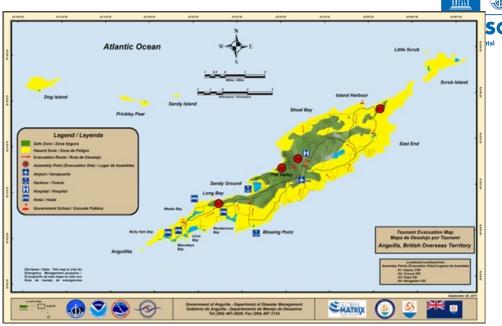
Setelah gelombang pertama datang, gelombang yang lain mungkin akan menyusul.

Tunggu pemberitahuan resmi "Tsunami telah berakhir" sebelum meninggalkan tempat perlindungan

\*Catatan: Ada prosedur khusus di area BTDC



Haiti







### **Anguilla**



### Puerto Rico

### Text on the back of an Evacuation Map Cedeño, Honduras







### Mensajes Oficiales de Tsunami para Honduras



Alerta Roja

Impacto de Tsunami Confirmado
 Mantenerse en los puntos de reunión

Siga las instrucciones de lo encargados de emergencias



· ¡Peligro de Inundación!

- Si está en la zona de evacuación, salga, Diríjase hacia los puntos de reunión
- Siga las instrucciones de los encargados de emergencias



Alerta Verde

Amarilla

Posibles corrientes peligrosas
 Salla del agua placa propto

- Salir del agua, playa, puertos marinos
- Estar en Observancia
- Siga las instrucciones de los encargados de emergencia



- No hay peligro
- Estar atento a información oficial

Boletín Informativo

Para Más Información
Comisión Permanente de Contingencias (COPECO)
http://copeco.gob.hn/
v CODEL Cedeño

y CODEL Cedeño En caso de Emergencia llamar 911





### En Honduras Sí Ocurren Tsunamis

Los Tsunamis en Honduras no son tan frecuentes pero sí han ocurrido y pueden volver a ocurrir en cualquier momento. Las costas Sur y Norte son vulnerables.

En Centro América han ocurrido unos 49 tsunamis desde los tiempos coloniales. Se generaron a consecuencia de terremotos en fallas cerca a las costas del Pacifico, como del Caribe y también distantes.

Uno de los tsunamis que afectó las costas hondureñas ocurrió el 4 de agosto de 1856. El mismo se generó en el Golfo de Honduras cerca de Belice y bañó toda la costa norte: Tela, La Ceiba, Trujillo y llegó hasta Gracias a Dios.

También se han registrado tsunamis en la parte sur, en el Golfo de Fonseca.

### ¿Qué es un Tsunami?

- Un tsunami es una serie de olas causada por una fuerte perturbación de un cuerpo de agua.
- Estas olas pueden llegar en unos minutos, pero continuar por horas. Las olas arrasan con todo lo que encuentran a su paso ya sea cuando inundan la costa o cuando retroceden.
- Los tsunamis pueden ser producidos por grandes terremotos localizados en la costa o en el fondo marino, un deslizamiento o una erupción volcánica.
- En Honduras se encuentran fuentes potenciales de tsunamis que se pueden generar localmente y también existen fuentes regionales y distantes, al otro lado del océano.

### Alarma Personal Para Terremotos y Tsunamis LOCALES

Los Terremotos ocurren de forma súbita, y en el caso que sean cercanos y generen tsunamis, las olas pueden llegar antes que le llegue una alerta oficial. Siga estas recomendaciones:

Protéjase durante el terremoto: Agáchese, Cúbrase y Sujétese

Salga rápidamente de la zona de evacuación por tsunami en cualquiera de las siguientes situaciones:

- Después de SENTIR un terremoto fuerte que te tumbe o dure más de veinte segundos
- Si VE un repentino aumento o disminución del nivel del mar
- Si OYE un ruido extraño o fuerte que viene del mar

### ¡¡PROTÉJASE, VIVA PARA CONTARLO!!!

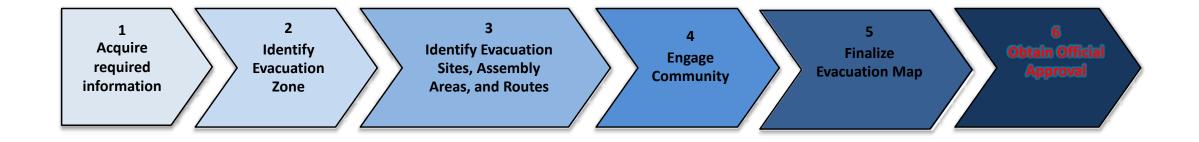




## Trinidad & Tobago







Evacuation maps are <u>public safety products</u> that should be <u>approved by the appropriate local governing authority</u>. The type and placement of signage should also be approved by the appropriate authority.

## PREP-3. Outreach and public awareness and education resources are available and distributed.







- \* Materials should include, where appropriate, <u>tsunami</u> <u>evacuation maps</u>, evacuation routes, <u>safety tips</u> and information about <u>when and how to respond to warnings</u> (including natural warnings for regions with a local tsunami threat).
- \* They should be tailored to <u>meet local information needs</u> and be based on location-specific tsunami threats.
- \* All schools within the community requesting recognition should receive a copy of the materials.





### **Outreach methods**







### <u>Three or more</u> methods should be used, including:

- Brochures and flyers distributed at public venues and/or bulk mailed to local residents and businesses.
- Comics and boardgames
- Newspaper articles and inserts.
- Public utility/service industry bill safety notices
- Local faith-based and civic organization bulletins/mailings.
- Local radio and television.
- Billboard, roadside, highway or educational signs.
- Historical markers and interpretative signs.
- Websites/Social media.
- Bulk email.





Tsunami terjadi bila :

## Possible physical locations for distribution of material







Locations for the distribution of outreach material will depend on the nature of the material, some other examples include:

- Schools
- Visitor centres and local tourist businesses (e.g. restaurants, bars etc)
- Hotels, motels and campgrounds
- Public libraries
- Community centres
- Kiosks or information centres (e.g. malls, stores etc)
- Childcare centres
- Banks
- Utility companies
- Health centres
- Ports of entry



## Important considerations in developing awareness material and campaigns



- \* <u>Local or traditional knowledge</u>: This can be a powerful tool to support scientific knowledge in community preparedness. Although it may be the most effective means in a more traditional or remote community, in general, local traditional knowledge alone will not be enough to ensure an effective response. Additional information on warning systems and evacuation and return arrangements is required.
- \* <u>Community needs</u>: To be effective, awareness activities and material should be tailored to the country or area-specific community needs. Factors such as geography, demographics, language, cultural, religious and social orientations should influence the awareness approach. They will present both strengths and opportunities.
- \* <u>Coordination and collaboration</u>: Working together among the different agencies involved is essential. Involvement and commitment by all stakeholders will support sustainability.







- \* <u>Public policy</u>: A formal tsunami education and awareness programme that is able to sustain itself over political cycles and generations can be highly effective, and may be the only feasible (funded) mitigation for localities where the occurrence of tsunamis is infrequent.
- \* <u>A multi-faceted approach</u>: The awareness programme should target a variety of formal and informal education, and awareness-building and preparedness activities such as exercises or drills
- \* <u>Content</u>: Campaigns and material should anticipate and answer the obvious questions of the target audience simply and clearly.



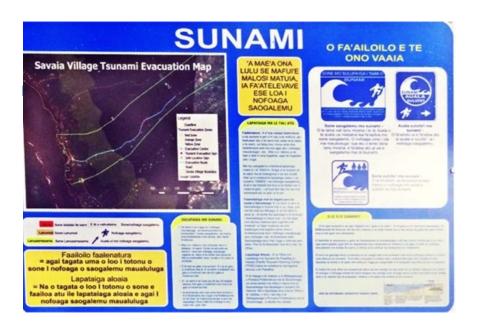






Fig 16. Trained Community Disaster Management Committee of Nasautoka village, Wainibuka, Tailevu

Community Based Disaster Risk Management













### **Tsunamis**



### Antes

Esté siempre preparado(a), un tsunami puede ocurrir en cualquier momento

- a) Prepare un plan familiar de emergencia
- b) Tenga a mano un maletín de seguridad
- c) Conozca las zonas de evacuación y los lugares de Asamblea
- d) Identifique las rutas de evacuación





### Señales

Esté atento(a) a cualquiera de estas señales

- a) Terremoto muy fuerte (se hace difícil caminar, se caen objetos)
- b) Terremoto de larga duración
- c) Mensaje oficial de la CNE
- d) Cambio repentino en el nivel del mar
- e) Ruido fuerte del mar



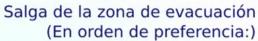


### Terremoto

Protéjase en caso de terremoto

- a) Agáchese
- b) Cúbrase
- c) Agárrese

### Evacuación





Oceanographic Commission



- b) Súbase a un segundo piso o más alto
- c) Súbase a un árbol
- d) Vaya a un lugar de reunión (refugio)
- e) Si hay tiempo, lleve las embarcaciones costa afuera
- a 100m de profundidad



### Regreso

Quédese fuera de la zona de evacuación hasta que las autoridades le indiquen que ha pasado el peligro.

















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#### WHAT IS TSUNAMI?

It is a series of waves in the sea produced by a strong earthquake, landslide or volcanic eruption.

#### WHEN DOES IT HAPPEN?

It can occur at any time and arrive in a few minutes to the coast. Tsunamis travel at the speed of a supersonic jet or plane

#### **EFFECT OF A TSUNAMI**

It floods the coast and devastates everything. A tsunami wave can grow up to 10 meters high or even more

### SIGNS OF A TSUNAMI



Strong earthquakes, shake severely or for long time



\*A descent of the sea level "A wall of water approaching the coast



An approaching tsunami creates a loud roar.



RUN!

Get away from the coastal zones and look for the highest areas

### **TSUNAMI EVACUATION DRILL**



Source: COPECO HONDURAS, IOTIC, ITIC, LIPI

### FOR YOUR SAFETY!



### **EARTHQUAKE READY**

- Be alert, a strong or long earthquake may trigger a tsunami in short time.
- Move away from beaches and river banks, and seek information on what has happened.



### **TSUNAMI WARNING READY**

- Seek warning information from BMKG on national TV, local radio, or public announcement in your area.
- If there is a sound of siren or other warning dissemination devices, evacuate immediately.

BMKG Warning information provides tsunami THREAT LEVEL for each region

**MAJOR WARNING** 

Highest threat level, The communities must evacuate!

WARNING

Medium threat level, but still dangerous,

**ADVISORY** 

The communities must evacuate!
Low threat level, The communities must move away

from beaches and riverbanks!



### **EVACUATION READY**

- Upon feeling the earthquake or receiving tsunami warning, evacuate immediately to designated safe locations.
- Follow the evacuation route and signage, if available.
- If you don't know the location of the safe zone, run as far as possible from the coast



Information on the time of origin of the earthquake



Information on regions with tsunami warning:

- Red colour = MAJOR WARNING level
- Orange colour = WARNING level
- Yellow colour = ADVISORY level

Information on the regions with tsunami warning





### Prepare yourself from now!

- · Learn about tsunami and its signs!
- Find information from your local government about tsunami evacuation procedures in your area!
- Plan with your family on how to respond to a tsunami!

### PREP-4. Outreach or educational activities are held at unesco least three times a year.







Public outreach and educational activities should be conducted annually in the community.

- \* These activities may be multi-hazard as long as they include tsunamis in the content.
- \* The number of activities required for a given community will be three, where at least one is a community-wide event. The TRB may determine another amount.
- Leveraging of national, state and regional campaigns, including use of social media.
- Multi-hazard events or presentations.
- Booths at community events and fairs.
- Community tsunami safety workshops, town hall or similar public meetings.
- Presentations or workshops for faith-based or cultural organizations, community or civic groups.

Local public safety campaigns, such as "Tsunami Preparedness" week/month.

- Media workshops.
- Local business workshops to help them develop response and business continuity plans.
- Information for business owners for employee training, outreach or education that targets high-occupancy businesses in tsunami hazard zones (e.g. hotels, restaurants, fisheries, industrial sites).
- Door-to-door safety campaigns targeted to residents and businesses living or working in the community's tsunami hazard zone.

### PREP-5. A community tsunami exercise is conducted unesco at least every two years







- \* Conducting tsunami exercises is important to test the warning system and the evacuation plan to verify that it is operating effectively and ensure that the community understands what actions have to be taken when a warning is issued.
- \* Exercising also provides the opportunity to review the evacuation plan and fine tune it. More can be learnt from putting the plan into action and finding any gaps or weak points

\* There are five types of exercise ranging in complexity, time to organise and cost:

Type#1: Orientation workshops

Type#2: Tabletop exercises

Type#3: Drills

Type#4: Functional exercises Type#5: Full scale exercises

- \* Full scale exercises represent the culmination of a progressive exercise programme and should not be attempted without first conducting at least a tabletop and a functional exercise
- \* Detailed planning is vital to the success of any exercise, particularly when the public in involved, and a risk assessment should be conducted before engaging the public in evacuation drills
- \* Exercise evaluation is an important component of exercising to observe, record and report on the conduct of the exercise - what went right, what went wrong, what lessons were learned and what changes should be made to the evacuation plan









### TSUNAMI DRILL AT LAVENA VILLAGE SUCCESSFUL

16/10/2019



to be around 200 meters above the village grounds.

Villagers of Lavena in Taveuni successfully carried out a live simulation of a tsunami drill this morning as part of the national disaster awareness.

About 350 villagers consisting of men, women, children and the elderly participated in a first ever tsunami drill to be undertaken in a rural community in Fiji.

Turaga ni koro(Village head) Petero Waisea, said the village disaster response committee had drawn up a plan for disaster evacuation and the simulation exercise spearheaded by the National Disaster Management office, as part of the national disaster awareness exercise this year presented them with an opportunity to test themselves.

About 130 students from Lavena Primary school including pre-schoolers were also part of the exercise which required them to assemble on the village ground and to run as quickly as they can into the hills above the village compound. The hill is estimated

Acting Director NDMO Litiana Bainimarama said Lavena village was one of the villages badly affected in the height of TC Winston in 2016 and most of the village houses were either blown away or destroyed extensively.

"So the exercise is a significant one in the sense of preparedness because Lavena village location is considered vulnerable because their reef is close to the village shores and they can experience any kind of storm surge or even tsunami at any time, " Ms Bainimarama said.

"As such, the NDMO has provided capacity building for the village including a structure approach, a village disaster committee and a standard operating procedure for the school."





# THANK YOU Vinaka Vakalevu

For more information:

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e-mail: itic@unesco.org







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